| REVISIONS | | | |
|---|---|---|---|
| LTR | DESCRIPTION | DATE (YR-MO-DA) | APPROVED |
| A | Added RHA and class K devices. Added RHA requirements. Redrew entire document. -sld | 97-10-23 | K. A. Cottongim |
| B | Added case outlines Y and Z. Table I, $I_{IN}$ maximum limit, change from 4 mA to 5 mA. | 99-07-12 | Raymond Monnin |
| C | Made corrections to paragraph 4.3.5.a. Updated paragraph 1.2.3 to define the five reliability class levels. Made changes to table I . -sld | 01-07-10 | Raymond Monnin |
| D | Figure 1, case outlines Y and Z, change the maximum D/E dimension from 1.105" (28.07 mm") to 1.110" (28.19 mm) and change the R maximum dimension from 0.600" (1.52 mm) to .065" (1.65 mm). | 05-04-18 | Raymond Monnin |
| E | Add paragraph 1.5 and note 2. Add paragraph 3.2.3. Table 1, add new note 2 for enhanced low dose rate effects (renumber remaining notes in sequence). Paragraph 4.3.5.a, add enhanced low dose rate effects. Add RHA level P to device type 02 in paragraphs 1.3, 1.5, 4.3.5 (table), table I, and SMD bulletin. -gz | 07-06-06 | Robert M. Heber |
| F | Added footnote 1 to table II, under group C end-point electricals. Updated drawing paragraphs. -sld | 09-09-03 | Charles F. Saffle |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REV | | | | | | | | | | | | | | | | | | | |
| SHEET | | | | | | | | | | | | | | | | | | | |
| REV | | | | | | | | | | | | | | | | | | | |
| SHEET | | | | | | | | | | | | | | | | | | | |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| REV STATUS | REV | F | F | F | F | F | F | F | F | F | F | F | F | F | F |
| OF SHEETS | SHEET | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |

PMIC N/A

PREPARED BY
Gary Zahn

**STANDARD MICROCIRCUIT DRAWING**

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

CHECKED BY
Michael C. Jones

APPROVED BY
Kendall A. Cottongim

DRAWING APPROVAL DATE
93-12-06

REVISION LEVEL
F

**DEFENSE SUPPLY CENTER COLUMBUS**
**COLUMBUS, OHIO 43218-3990**
**http://www.dscc.dla.mil**

# MICROCIRCUIT, HYBRID, LINEAR, ±15 VOLT, DUAL CHANNEL, DC/DC CONVERTER

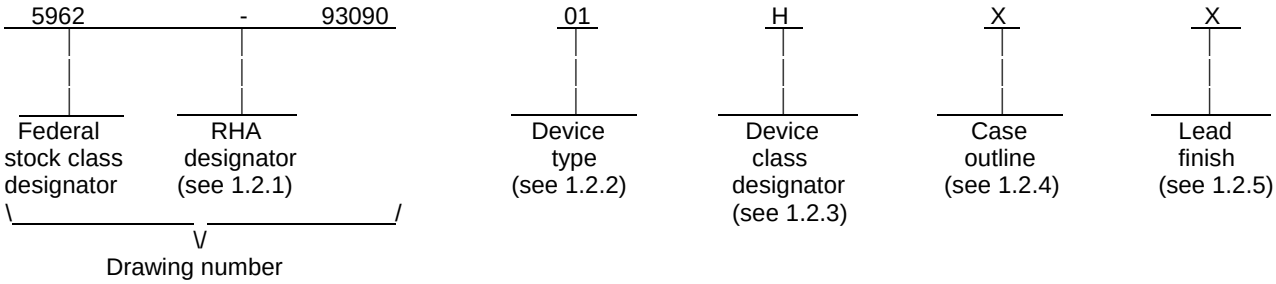
| SIZE | CAGE CODE | |
|---|---|---|
| A | **67268** | **5962-93090** |

SHEET 1 OF 14

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes as defined in paragraph 1.2.3 and MIL-PRF-38534. A choice of case outlines and lead finishes which are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

1.2 PIN. The PIN shall be as shown in the following example:




1.2.1 Radiation hardness assurance (RHA) designator. RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device type(s). The device type(s) identify the circuit function as follows:

| Device type | Generic number | Circuit function |
|---|---|---|
| 01 | MSA2815D/883, MGA2815D/883 | DC-DC converter, 5 W, ±15 V outputs |
| 02 | SMSA2815D | DC-DC converter, 5 W, ±15 V outputs |

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level. All levels are defined by the requirements of MIL-PRF-38534 and require QML Certification as well as qualification (Class H, K, and E) or QML Listing (Class G and D). The product assurance levels are as follows:

| Device class | Device performance documentation |
|---|---|
| K | Highest reliability class available. This level is intended for use in space applications. |
| H | Standard military quality class level. This level is intended for use in applications where non-space high reliability devices are required. |
| G | Reduced testing version of the standard military quality class. This level uses the Class H screening and In-Process Inspections with a possible limited temperature range, manufacturer specified incoming flow, and the manufacturer guarantees (but may not test) periodic and conformance inspections (Group A, B, C and D). |
| E | Designates devices which are based upon one of the other classes (K, H, or G) with exception(s) taken to the requirements of that class. These exception(s) must be specified in the device acquisition document; therefore the acquisition document should be reviewed to ensure that the exception(s) taken will not adversely affect system performance. |
| D | Manufacturer specified quality class. Quality level is defined by the manufacturers internal, QML certified flow. This product may have a limited temperature range. |

1.2.4 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

| Outline letter | Descriptive designator | Terminals | Package style |
|---|---|---|---|
| X | See figure 1 | 8 | Dual-in-line |
| Y | See figure 1 | 20 | Flat pack |
| Z | See figure 1 | 20 | Flat pack with formed leads |

1.2.5 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Input voltage range ..... -0.5 V dc to +50 V dc
Power dissipation ($P_D$):
  Device types 01 and 02 (non-RHA)..... 1.8 W
  Device type 02 (RHA levels P, L and R) ..... 2.0 W
Output power ..... 5.3 W
Lead soldering temperature (10 seconds)..... +300°C
Storage temperature range..... -65°C to +150°C

1.4 Recommended operating conditions.

Input voltage range ..... +16 V dc to +40 V dc
Case operating temperature range ($T_C$) ..... -55°C to +125°C

1.5 Radiation features.

Maximum total dose available (dose rate = 9 rad(Si)/s):
  Device type 02 (RHA levels P, L and R) .....100 krad (Si) 2/

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

MIL-PRF-38534 - Hybrid Microcircuits, General Specification for.

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard for Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.
2/ These parts may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects. Radiation end-point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, method 1019, condition C, tested at 9 rad(Si)/s.

3. REQUIREMENTS

3.1 Item requirements. The individual item performance requirements for device classes D, E, G, H, and K shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for the applicable device class. The manufacturer may eliminate, modify or optimize the tests and inspections herein, however the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. In addition, the modification in the QM plan shall not affect the form, fit, or function of the device for the applicable device class.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 herein and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

3.2.3 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall apply over the full specified operating temperature range.

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are defined in table I.

3.5 Marking of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1015 of MIL-STD-883.

(2) $T_A$ as specified in accordance with table I of method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

TABLE I. Electrical performance characteristics.

| Test | Symbol | Conditions 1/ 2/ $-55°C \le T_C \le +125°C$ $V_{IN}$ = 28 V dc ±0.5 V, $C_L$ = 0, unless otherwise specified | | Group A subgroups | Device types | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | Max | |
| Output voltage | $+V_{OUT}$ | $\pm I_{OUT}$ = 167 mA | | 1 | 01,02 | 14.85 | 15.15 | V |
| | | | | 2,3 | 01,02 | 14.40 | 15.60 | |
| | | | P,L,R | 1,2,3 | 02 | 14 | 16 | |
| | $-V_{OUT}$ | | | 1 | 01,02 | -14.70 | -15.30 | |
| | | | | 2,3 | 01,02 | -13.80 | -16.20 | |
| | | | P,L,R | 1,2,3 | 02 | -14 | -16 | |
| Output current 3/ | $I_{OUT}$ | $V_{IN}$ = 16 V dc to 40 V dc | | 1,2,3 | 01,02 | 0.0 | 267 | mA |
| | | | P,L,R | | 02 | 0.0 | 0.700 | |
| $V_{OUT}$ output ripple voltage | $V_{RIP}$ | $\pm I_{OUT}$ = 167 mA, B.W. = 10 kHz to 2 MHz | | 1 | 01 | | 150 | mV p-p |
| | | | | | 02 | | 300 | |
| ($\pm V_{OUT}$) | | | | 2,3 | 01 | | 250 | |
| | | | | | 02 | | 500 | |
| | | | P,L,R | 1,2,3 | 02 | | 2 | V p-p |
| $V_{OUT}$ line regulation $+V_{OUT}$ | $VR_{LINE}$ | $\pm I_{OUT}$ = 167 mA, $V_{IN}$ = 16 V dc to 40 V dc | | 1,2,3 | 01,02 | | 50 | mV |
| | | | P,L,R | | 02 | | 100 | |
| $-V_{OUT}$ | | | | | 01,02 | | 180 | |
| | | | P,L,R | | 02 | | 400 | |
| $V_{OUT}$ load regulation $+V_{OUT}$ | $VR_{LOAD}$ | $\pm I_{OUT}$ = 0 to 167 mA, both outputs changed simultaneously | | 1,2,3 | 01,02 | | 50 | mV |
| | | | P,L,R | | 02 | | 100 | |
| $-V_{OUT}$ | | | | | 01,02 | | 200 | |
| | | | P,L,R | | 02 | | 400 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ 2/ $-55°C \le T_C \le +125°C$ $V_{IN}$ = 28 V dc ±0.5 V, $C_L$ = 0, unless otherwise specified | | Group A subgroups | Device types | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Min | Max | |
| Input current | $I_{IN}$ | $\pm I_{OUT}$ = 0, inhibit pin (pin 1) = 0 V dc | | 1,2,3 | 01,02 | | 5 | mA |
| | | | P,L,R | | 02 | | 25 | |
| | | $\pm I_{OUT}$ = 0, inhibit pin (pin 1) = open | | | 01,02 | | 60 | |
| | | | P,L,R | | 02 | | 100 | |
| Input ripple current | $I_{RIP}$ | $\pm I_{OUT}$ = 167 mA, LIN = 2 µH, B. W. = 10 kHz to 10 MHz | | 1 | 01 | | 100 | mA p-p |
| | | | | | 02 | | 200 | |
| | | | | 2,3 | 01 | | 150 | |
| | | | | | 02 | | 300 | |
| | | | P,L,R | 1,2,3 | 02 | | 600 | |
| Efficiency | Eff | $\pm I_{OUT}$ = 167 mA | | 1 | 01 | 70 | | % |
| | | | | | 02 | 68 | | |
| | | | | 2,3 | 01 | 68 | | |
| | | | | | 02 | 66 | | |
| | | | P,L,R | 1,2,3 | 02 | 64 | | |
| Isolation | ISO | 500 V dc, Input to output, input to case or output to case, $T_C$ = +25°C | | 1 | 01,02 | 100 | | MΩ |
| | | | P,L,R | | 02 | 100 | | |
| Short circuit internal power dissipation | $P_D$ | $P_D = P_{IN}$ - total $P_{OUT}$ | | 1 | 01,02 | | 1.6 | W |
| | | | | 2,3 | | | 1.8 | |
| | | | P,L,R | 1,2,3 | 02 | | 2.0 | |
| Switching frequency | $F_S$ | $\pm I_{OUT}$ = 167 mA | | 4 | 01,02 | 450 | 600 | kHz |
| | | | | 5,6 | 01,02 | 400 | 620 | |
| | | | P,L,R | 4,5,6 | 02 | 400 | 600 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ 2/ $-55°C \le T_C \le +125°C$ $V_{IN}$ = 28 V dc ±0.5 V, $C_L$ = 0, unless otherwise specified | Group A subgroups | Device types | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| $V_{OUT}$ response to step transient load changes 4/ ($\pm V_{OUT}$) | $VO_{TLOAD}$ | 50% load to/from 100% load; balanced loads on each output | 4 | 01 | -450 | +450 | mV pk |
| | | | | 02 | -600 | +600 | |
| | | | 5,6 | 01,02 | -1400 | +1400 | |
| | | P,L,R | 4,5,6 | 02 | -3000 | +3000 | |
| $V_{OUT}$ recovery time from step transient load changes 4/ 5/ ($\pm V_{OUT}$) | $TT_{LOAD}$ | 50% load to/from 100% load; balanced loads on each output | 4 | 01,02 | | 500 | µs |
| | | | 5,6 | 01,02 | | 4500 | |
| | | P,L,R | 4,5,6 | 02 | | 6000 | |
| $V_{OUT}$ response to step transient line changes 6/ 7/ | $VO_{TLINE}$ | $V_{IN}$ = 16 V dc to 40 V dc, $\pm I_{OUT}$ = 167 mA | 4,5,6 | 01,02 | -1.5 | +1.5 | V pk |
| | | P,L,R | | 02 | -3.0 | +3.0 | |
| | | $V_{IN}$ = 40 V dc to 16 V dc, $\pm I_{OUT}$ = 167 mA | | 01 | -1.0 | +1.0 | |
| | | | | 02 | -1.5 | +1.5 | |
| | | P,L,R | | 02 | -3.0 | +3.0 | |
| $V_{OUT}$ recovery time from step transient line changes 5/ 6/ 7/ | $TT_{LINE}$ | $V_{IN}$ = 16 V dc to 40 V dc, $\pm I_{OUT}$ = 167mA | 4,5,6 | 01 | | 1.2 | ms |
| | | P,L,R | | 02 | | 6.0 | |
| | | $V_{IN}$ = 40 V dc to 16 V dc, $\pm I_{OUT}$ = 167 mA | | 01,02 | | 1.2 | |
| | | P,L,R | | 02 | | 6.0 | |
| Start-up delay 8/ | $Ton_D$ | $V_{IN}$ = 0 V dc to 40 V dc, $\pm I_{OUT}$ = 167 mA | 4,5,6 | 01,02 | | 25 | ms |
| | | P,L,R | | 02 | | 50 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions 1/ 2/ $-55°C \le T_C \le +125°C$, $V_{IN}$ = 28 V dc ±0.5 V, $C_L$ = 0, unless otherwise specified | Group A subgroups | Device types | Limits | | Unit |
|---|---|---|---|---|---|---|---|
| | | | | | Min | Max | |
| Start-up overshoot 6/ | $Vton_{OS}$ | $V_{IN}$ = 0 V dc to 40 V dc, $\pm I_{OUT}$ = 167 mA | 4 | 01,02 | | 500 | mV pk |
| | | | 5,6 | | | 750 | |
| | | P,L,R | 4,5,6 | 02 | | 1200 | |
| Load fault recovery 5/ 6/ | $Tr_{LF}$ | $\pm I_{OUT}$ = from S.C. to 167 mA | 4,5,6 | 01,02 | | 50 | ms |
| | | P,L,R | | 02 | | 50 | |
| Capacitive load, 6/ 9/ (both outputs) | $C_L$ | No effect on dc performance, $T_C$ = +25°C | 4 | 01,02 | | 10 | µF |
| | | P,L,R | | 02 | | 10 | |

1/ Post irradiation testing shall be in accordance with 4.3.5. herein.

2/ These parts may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects. Radiation end-point limits for the noted parameters are guaranteed only for the conditions as specified in MIL-STD-883, method 1019, condition C, tested at 9 rads(Si)/s.

3/ The total output power available is 80 percent from either output up to 4 watts, providing the opposite output is simultaneously carrying 20 percent of the total output power. Each output must carry a minimum of 20 percent of the total output power in order to maintain regulation on the negative output.

4/ Load step transition greater than 10 microseconds.

5/ Recovery time is measured from the initiation of the transient to where $V_{OUT}$ has returned to within ±1 percent of its final value.

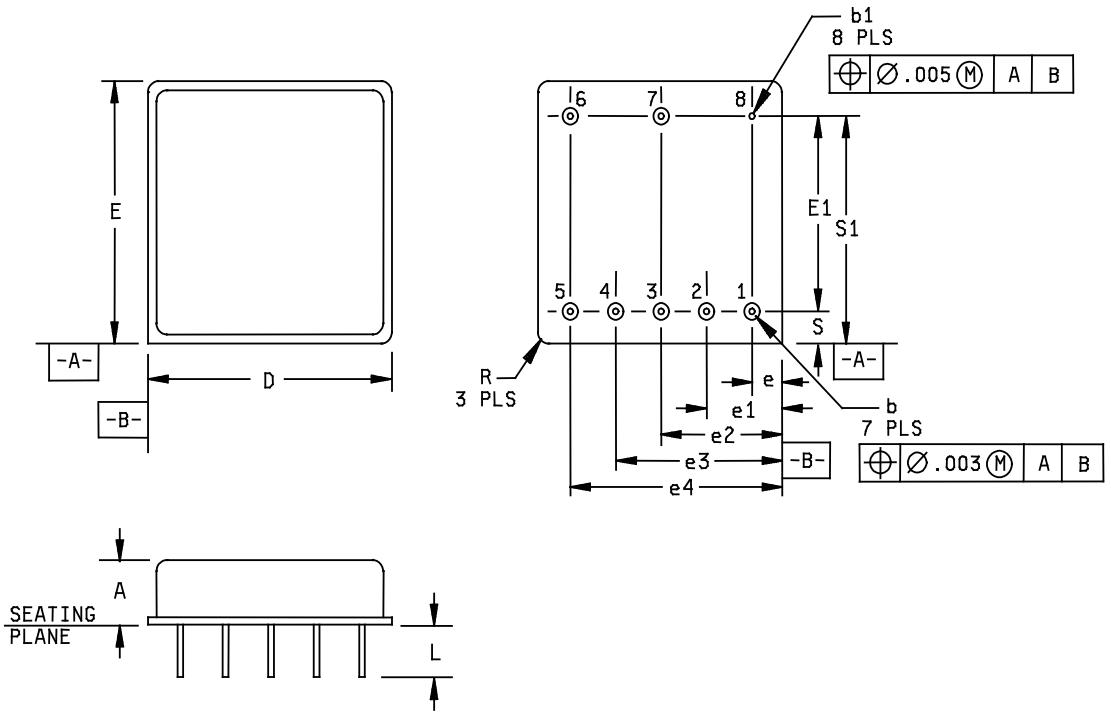
6/ Parameter shall be tested as part of design characterization and after design or process changes. Therefore, the parameter shall be guaranteed to the limits specified in table I.

7/ Input step transition greater than 10 microseconds.

8/ Start-up delay time measurement is for either a step application of power at the input or the removal of a ground signal from the inhibit pin while power is applied to the input.

9/ Capacitive load may be any value from 0 to the maximum limit without compromising dc performance.

Case outline X.

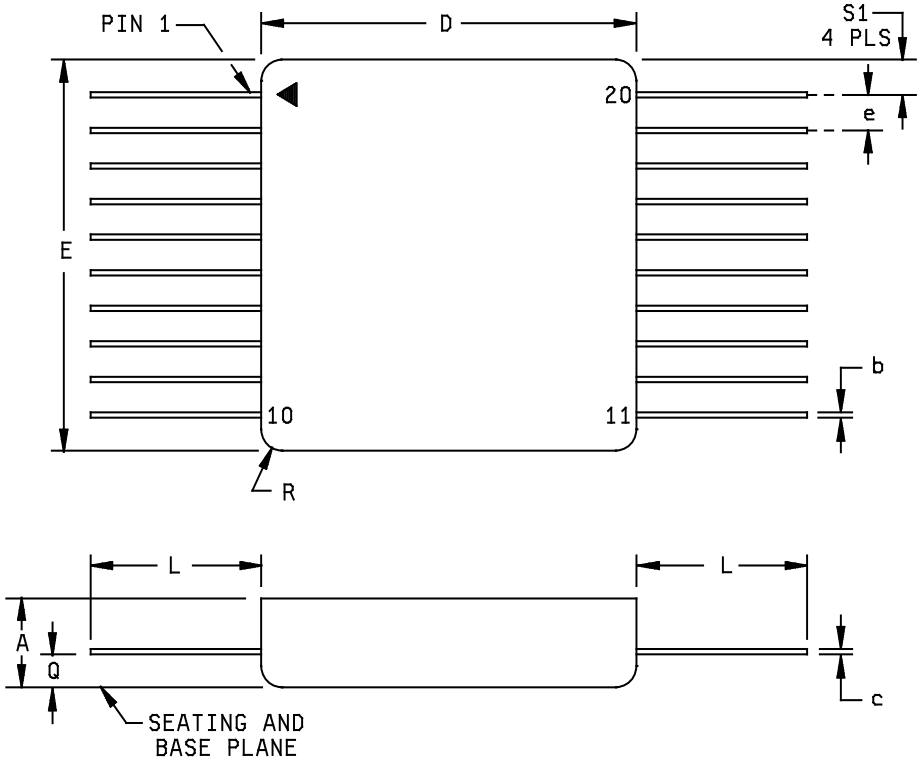



| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | | 6.86 | | .270 |
| b | 1.79 DIA | | .070 DIA | |
| b1 | 0.64 DIA | | .025 DIA | |
| D/E | | 27.31 | | 1.075 |
| E1 | 20.19 | 20.45 | .795 | .805 |
| e/S | 3.23 | 3.48 | .127 | .137 |
| e1 | 8.31 | 8.56 | .327 | .337 |
| e2 | 13.39 | 13.64 | .527 | .537 |
| e3 | 18.47 | 18.72 | .727 | .737 |
| e4/S1 | 23.55 | 23.80 | .927 | .937 |
| L | | 5.59 | | .220 |
| R | 1.14 | 1.40 | .045 | .055 |

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Pin numbers are for reference only.
3. Case outline X weight: 15 grams maximum.

FIGURE 1. Case outline(s).

Case outline Y.

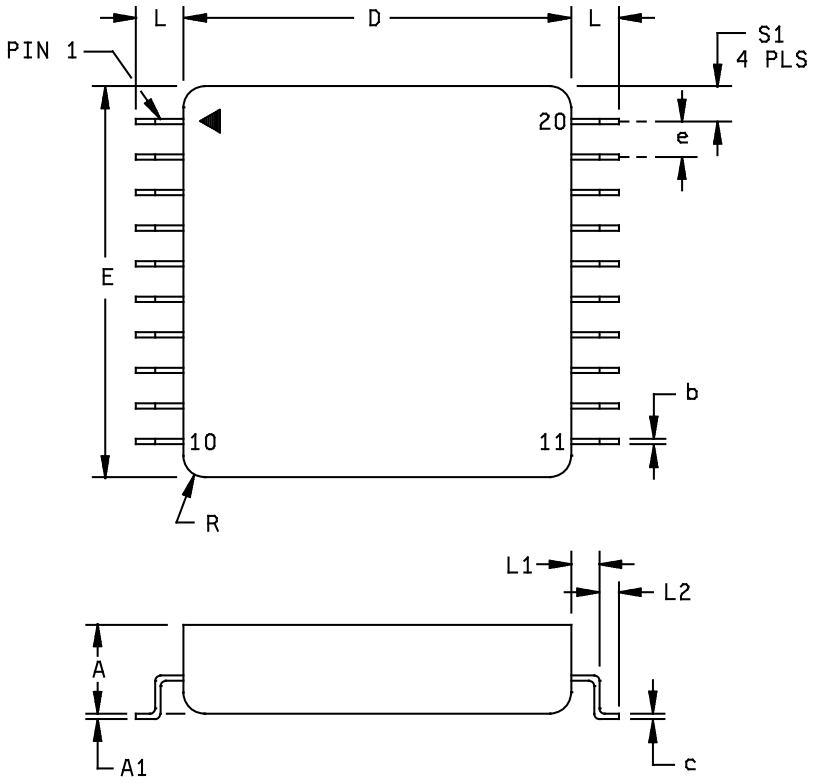



| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | | 6.36 | | .250 |
| b | 0.30 | 0.56 | .012 | .022 |
| c | 0.20 | 0.41 | .008 | .016 |
| D/E | 27.81 | 28.19 | 1.095 | 1.110 |
| e | 2.54 BSC | | .100 BSC | |
| L | 12.7 TYP | | .500 TYP | |
| Q | 1.78 | 2.29 | .070 | .090 |
| R | | 1.65 | | .065 |
| S1 | 2.29 | 2.79 | .090 | .110 |

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Lead identification for reference only.
3. Case outline Y weight: 15 grams maximum.

FIGURE 1. Case outline(s) - Continued.

Case outline Z.




| Symbol | Millimeters | | Inches | |
|---|---|---|---|---|
| | Min | Max | Min | Max |
| A | | 6.36 | | .250 |
| A1 | 0.13 | 0.51 | .005 | .020 |
| b | 0.30 | 0.56 | .012 | .022 |
| c | 0.20 | 0.41 | .008 | .016 |
| D/E | 27.81 | 28.19 | 1.095 | 1.110 |
| e | 2.54 BSC | | .100 BSC | |
| L | 3.43 REF | | .135 REF | |
| L1 | 1.52 | 2.03 | .060 | .080 |
| L2 | 1.14 | 1.65 | .045 | .065 |
| R | | 1.65 | | .065 |
| S1 | 2.29 | 2.79 | .090 | .110 |

NOTES:
1. The U.S. government preferred system of measurement is the metric SI. This item was designed using inch-pound units of measurement. In case of problems involving conflicts between the metric and inch-pound units, the inch-pound units shall rule.
2. Lead identification for reference only.
3. Case outline Z weight: 15 grams maximum.

FIGURE 1. Case outline(s) - Continued.

| Device types | 01 | 01 and 02 |
|---|---|---|
| Case outlines | Y and Z | X |
| Terminal number | Terminal symbol | Terminal symbol |
| 1 | Inhibit | Positive output |
| 2 | Positive input | Output return |
| 3 | Positive input | Negative output |
| 4 | No connection | No connection |
| 5 | Input common | Inhibit |
| 6 | Input common | Input |
| 7 | Case ground | Input return |
| 8 | Case ground | Case ground |
| 9 | No connection | |
| 10 | No connection | |
| 11 | Positive output | |
| 12 | Positive output | |
| 13 | Output common | |
| 14 | Output common | |
| 15 | Negative output | |
| 16 | Negative output | |
| 17 | No connection | |
| 18 | No connection | |
| 19 | Case ground | |
| 20 | Case ground | |

FIGURE 2. Terminal connections.

TABLE II. Electrical test requirements.

| MIL-PRF-38534 test requirements | Subgroups (in accordance with MIL-PRF-38534, group A test table) |
|---|---|
| Interim electrical parameters | ---- |
| Final electrical parameters | 1*, 2, 3, 4, 5, 6 |
| Group A test requirements | 1, 2, 3, 4, 5, 6 |
| Group C end-point electrical 1/ Parameters | 1, 2, 3 |
| End-point electrical parameters for Radiation Hardness Assurance (RHA) devices | 1, 2, 3, 4, 5, 6 |

1/ As a minimum, for all Group C testing performed after (09-09-03) manufacturers shall perform subgroups 1, 2, and 3 from the Group A electrical test table (Table C-Xa of MIL-PRF-38534).
* PDA applies to subgroup 1.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 7, 8, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test, method 1005 of MIL-STD-883.

(1) Test condition A, B, C, or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in method 1005 of MIL-STD-883.

(2) $T_A$ as specified in accordance with table I of method 1005 of MIL-STD-883.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

4.3.5 Radiation Hardness Assurance (RHA). RHA qualification is required only for those devices with the RHA designator as specified herein.

| | RHA level P | RHA level L | RHA level R | Units |
|---|---|---|---|---|
| Total ionizing dose tolerance level | 30 | 50 | 100 | kRad(Si) |
| Single event upset survival level (LET) | 40 | 40 | 40 | MeV |

a. Radiation dose rate is in accordance with condition C of method 1019 of MIL-STD-883. Unless otherwise specified, components are tested at a rate of 9 rad(Si)/s, in accordance with method 1019 of MIL-STD-750 or MIL-STD-883, as applicable. These parts may be dose rate sensitive in a space environment and may demonstrate enhanced low dose rate effects.

b. The manufacturer shall perform a worst-case and radiation susceptibility analysis on the device. This analysis shall show that the minimum performance requirements of each component has adequate design margin under worst-case operating conditions (extremes of line voltage, temperatures, load, frequency, radiation environment, etc.). This analysis guarantees the post-irradiation parameter limits specified in table I.

c. RHA testing shall be performed at the component level for initial device qualification, and after design changes that may affect the RHA performance of the device. As an alternative to testing, components may be procured to manufacturer radiation guarantees that meet the minimum performance requirements. Component radiation performance guarantees shall be established in compliance with MIL-PRF-19500, Group D or MIL-PRF-38535, Group E, as applicable. For components with less than adequate performance margin, component lot radiation acceptance screening shall be performed.

d. The manufacturer shall establish procedures controlling component radiation testing, and shall establish radiation test plans used to implement component lot qualification during procurement. Test plans and test reports shall be filed and controlled in accordance with the manufacturer's configuration management system.

e. The device manufacturer shall designate a RHA program manager to oversee component lot qualification, and to monitor design changes for continued compliance to RHA requirements.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated as specified in MIL-PRF-38534.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) when a system application requires configuration control and the applicable SMD. DSCC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-1081.

6.6 Sources of supply. Sources of supply are listed in MIL-HDBK-103 and QPDSIS-38534. The vendors listed in MIL-HDBK-103 and QPDSIS-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 09-09-03

Approved sources of supply for SMD 5962-93090 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QPDSIS-38534 during the next revisions. MIL-HDBK-103 and QPDSIS-38534 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This information bulletin is superseded by the next dated revisions of MIL-HDBK-103 and QPDSIS-38534. DSCC maintains an online database of all current sources of supply at http://www.dscc.dla.mil/Programs/Smcr/.

| Standard microcircuit drawing PIN 1/ | Vendor CAGE number | Vendor similar PIN 2/ |
|---|---|---|
| 5962-9309001HXA | 50821 | MSA2815D/883 |
| 5962-9309001HXC | 50821 | MSA2815D/883 |
| 5962-9309001HYA | 50821 | MGA2815D/883 |
| 5962-9309001HYC | 50821 | MGA2815D/883 |
| 5962-9309001HZA | 50821 | MGA2815DZ/883 |
| 5962-9309002HXA | 50821 | SMSA2815D/HO |
| 5962-9309002HXC | 50821 | SMSA2815D/HO |
| 5962P9309002HXA | 50821 | SMSA2815D/HP |
| 5962P9309002HXC | 50821 | SMSA2815D/HP |
| 5962L9309002HXA | 50821 | SMSA2815D/HL |
| 5962L9309002HXC | 50821 | SMSA2815D/HL |
| 5962R9309002HXA | 50821 | SMSA2815D/HR |
| 5962R9309002HXC | 50821 | SMSA2815D/HR |
| 5962P9309002KXA | 50821 | SMSA2815D/KP |
| 5962P9309002KXC | 50821 | SMSA2815D/KP |
| 5962L9309002KXA | 50821 | SMSA2815D/KL |
| 5962L9309002KXC | 50821 | SMSA2815D/KL |
| 5962R9309002KXA | 50821 | SMSA2815D/KR |
| 5962R9309002KXC | 50821 | SMSA2815D/KR |

1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the Vendor to determine its availability.

2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

| Vendor CAGE number | Vendor name and address |
|---|---|
| 50821 | Interpoint Corporation<br>10301 Willows Road<br>Redmond, WA 98073-9705 |